* Probability *

- It is the measure of the likelihood of an event.

E.g. Tossing a coin.
$S = \{H, T\}$

$$\text{Probability} = \frac{\text{No. of ways an event can occur}}{\text{No. of possible outcomes}}$$

$Pr(H) = 1/2$

E.g: Rolling a Dice
$S = \{1, 2, 3, 4, 5, 6\}$
$Pr(1) = 1/6$
$Pr(2) = 1/6$
⋮
$Pr(6) = 1/6$

* Mutual Exclusive Event :-

Venn diagram

E.g: Tossing a coin
possible ⇒ [H or T] ✓ [H & T] ✗

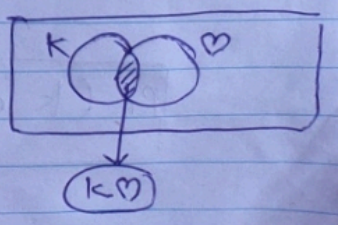
⇓
Is mutual exclusive

* Not Mutual Exclusive Event:
E.g: Taking out a card from deck of cards

possible: [King & ♡] ✓

⇓
Is non mutual exclusive

Venn Diagram



E.g : Tossing a coin

Q). Pr (H or T) ? $= Pr(H) + Pr(T)$

Mutual exclusive $= 1/2 + 1/2$

$= 1$

E.g : Rolling a dice

Q) Pr (1 or 2 or 3) $= Pr(1) + Pr(2) + Pr(3)$

Mutual exclusive $= 1/6 + 1/6 + 1/6$

$= 0.5$

This technique is called for Additive Rule (ME)

Lets, ~~find~~ check formula for non mutual exclusive

e.g : Taking out a card from the deck

Q). Pr (K or ♡) $= Pr(K) * Pr(♡)$ (and)

$\Rightarrow \neq 4/52 * 13/52$

$Pr(K) = 4/52$

$Pr(♡) = 13/52$

$Pr(K \text{ and } ♡) = 1/52$

$Pr(K \text{ or } ♡) = Pr(K) + Pr(♡) - P(K \cap ♡)$

$= 4/52 + 13/52 - 1/52$

$Pr(K \text{ or } ♡) = 16/52$

Formula's we have seen for mutual & non mutual exclusive event - Additive rule.

* Addictive Rule :-

ME	$Pr(A \text{ or } B) = Pr(A) + Pr(B)$
NME	$Pr(A \text{ or } B) = Pr(A) + Pr(B) - Pr(A \cap B)$

* Multiplicative Rule :-

Independent Event	Dependent Event
e.g: Tossing a coin H T H {1, 2, 3} 1st Experiement $\Rightarrow Pr(H) = \frac{1}{2}$ 2nd Experiement $\Rightarrow Pr(T) = 1/2$ 3rd Experiement $= Pr(H) = 1/2$	e.g: Taking a card from a deck 1st Experiement $\Rightarrow Pr(K) = 1/52$ 2nd Experiement $\Rightarrow Pr(Q) = 1/51$ 3rd Experiement $\Rightarrow Pr(J) = 1/50$
- No. of total outcome will not reduce	No. of total outcome will reduce

① Independent Event

e.g : Rolling a dice

Q) Pr(1 and 3) ?

$$\boxed{Pr(A \text{ and } B) = Pr(A) * Pr(B)} \leftarrow \text{formula}$$

$$Pr(1 \text{ and } 3) = Pr(1) * Pr(3)$$

$$= 1/6 * 1/6$$

$$= \frac{1}{36} //$$

② Dependent Event

e.g: Removing / taking out a card from deck.

Q) Pr(k and Q) ?

$$\boxed{Pr(A \text{ and } B) = Pr(A) * Pr(B/A)} \leftarrow \text{formula}$$

$$Pr(k \text{ and } Q) = Pr(k) * Pr(Q/k)$$

$$= 1/52 * \frac{1}{51}$$

$$= \frac{1}{2652}$$

*Multiplicative Rule Formula :-

Independent $Pr(A \text{ and } B) = Pr(A) * Pr(B)$

Dependent $Pr(A \text{ and } B) = Pr(A) * P(B/A)$ → Conditional Event